Exhibit 7

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF TEXAS
HOUSTON DIVISION

EXXON MOBIL CORPORATION,	)	
Plaintiff,	)	
v.	)	Civil Action Nos. H-10-2386 (LHR)
	)	H-11-1814 (LHR)
UNITED STATES OF AMERICA,	)	
Defendant.	)	

DECLARATION OF PETER J. GAGNON

I, Peter J. Gagnon, declare as follows:

1. I am over 18 years of age, and I am fully competent to make this declaration. I reside at 3914 Bellows Bend Court, Katy, Texas, 77450. I have personal knowledge of the facts set forth in this declaration and am competent to testify to them if necessary. All of the facts stated herein are true and correct.

2. I am a Senior Partner with Environmental Resources Management (ERM), a leading global provider of environmental, health, safety, risk, social consulting, and sustainability services. I graduated from Villanova University in Villanova, Pennsylvania with a Bachelor of Civil Engineering in 1992 and obtained a Master of Science in Environmental Engineering from the University of Massachusetts in Amherst, Massachusetts in 1994. I have over 19 years of professional experience as an environmental consultant with ERM, primarily in the area of site assessment and remediation at industrial sites (including refineries, chemical plants, etc.) for private sector clients. Most of the sites at which I have worked are located in Texas, Louisiana, Alabama, or Montana. I am a licensed Professional Environmental Engineer in Texas and Montana. In addition, I am a Board Certified Environmental Engineer by the American Academy of Environmental Engineers in the specialty area of Hazardous Waste Management. My resume and qualifications are attached as **Attachment 1**.

3. I have been working on various environmental assessment, remediation, and compliance projects at the ExxonMobil Baytown Complex and adjacent areas ("Baytown Site") since 2003. From 2007 to 2013 I was partner-in-charge of all ERM projects at the Baytown Complex and am responsible for directing a team of engineers and scientists conducting assessment, monitoring, and cleanup activities at the Baytown Site. Since 2013 I have been partner-in-charge for select assessment, remediation, and compliance projects at the Baytown Site. Given my extensive knowledge of and involvement in past cleanup activities at the Baytown Site, I understand that I may be called by Exxon Mobil Corporation ("ExxonMobil") to

testify as a factual witness regarding the nature and conduct of certain environmental cleanup actions at the Baytown Site in the above-captioned cases.

4. Based on my knowledge of the past and ongoing cleanup work at the Baytown Site, ExxonMobil has been conducting inter-related and coordinated environmental investigations and cleanup work to respond to and address historical contamination (*i.e.*, past releases of hazardous substances that resulted from historical operations, including operations occurring during the wartime period) at the Baytown Site. A significant portion of this past and ongoing cleanup work has been voluntary in nature. For example, much of ExxonMobil's relevant cleanup work performed prior to issuance of the two Agreed Orders in 1995 was voluntary as it was not done under an administrative settlement with a federal or state governmental entity. This cleanup work included, for instance, the closure of Separators 2, 3M and 10 and the South Landfarm, and delay of closure of the Lower and Upper Outfall Canals and the Velasco Street Ditch. Subsequently, ExxonMobil has been working with the Texas Commission on Environmental Quality ("TCEQ") to establish a Facility Operations Area ("FOA") for the refinery and the chemical plant, respectively, at the Baytown Site. TCEQ established the voluntary FOA program so that large industrial facilities could develop and implement a facility-wide, cost-effective approach for addressing contamination at the facility at issue under the approval and oversight of TCEQ, and this process is ongoing at the Baytown Site.

5. I have also been retained by ExxonMobil to serve as an expert witness to address key aspects of the environmental cleanup program at the Baytown Site. I submitted a rebuttal report dated December 20, 2012 ("Rebuttal Report") and gave testimony in a subsequent deposition in this case. My statements in this declaration merely summarize or address my opinions previously provided in my Rebuttal Report. However, since Dr. Kittrell attempts to apply the empirical equation known as "Darcy's Law" which he had not previously discussed, my statements in this declaration also address matters related to this scientific topic. I incorporate by reference my Rebuttal Report which is attached hereto as **Attachment 2** into this sworn declaration.

6. Both Dr. Kittrell and Mr. Low question the validity of two process efficiency improvement factors - the 70% separator sludge reduction factor and the 90% pre-separators oil reduction factor - employed by expert allocator Richard White. Kittrell Declaration ¶¶ 9 and 10; Low Declaration ¶¶ 24 and 30. However, Mr. White's use of these two process efficiency improvement factors is appropriate for several reasons.

a. Separator sludge is a basic, common contaminant generated by the operations of oil refineries. According to an historical and technical journal article regarding the generation and management of solid wastes by the petroleum industry, while "the final products have changed, certain characteristics of petroleum refining have endured" and one of those characteristics is that "petroleum refining generates sludges."[1] In fact, the "four major types of sludge generated by

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1 J. Perkins. An Historical Overview of Solid Waste Management in the Petroleum Industry, Discussion Paper #062 (American Petroleum Institute; Oct. 1990) ("Historical Overview of Solid Waste Management in the Petroleum Industry") at 9. [BAYTECH-00014798 to BAYTECH-00014857 at BAYTECH-00014811].

refineries [are] processing, cooling tower, wastewater treatment, and slop oil sludges."[2] However, since the late 1940s the petroleum refining industry has implemented numerous production and waste processing efficiencies to reduce the generation of sludges, and to improve the separators' design and construction and the refinery's overall waste processing facilities in order to better manage and treat such sludges.[3] This is one of the basic forms of pollution generated by refineries.

i. One of the primary reasons why the petroleum refining industry sought to reduce sludge generation and improve waste processing facilities was because separator sludge was a significant, potential source of contamination. For example, separator sludge was a significant source of historical soil, ground water and surface waters/sediments contamination at the Baytown Site prior to the elimination of earthen separators, sludge pits and other surface impoundments a number of decades ago at the Baytown Site. Sludge historically contributed to contamination at the Baytown Site in numerous locations and respects, such as, for example, the following: (1) soils and ground water at or in the vicinity of the separators where much of the sludge was removed from the wastewaters; (2) soils and ground water in the vicinity of a number of former earthen sludge pits, such as, for example, Separator 3M or solid waste management unit ("SWMU") 59 once a portion of Mitchell Bay; (3) the Outfall Canals and the soils and ground water at or in the vicinity of the Canals because the wastewater conveyed to the Canals would have contained residual sludge; and (4) adjacent surface waters where the wastewater containing residual sludge was historically discharged.

ii. Given that such sludge was a significant, potential source of historical contamination to many areas at the Baytown Site, reductions in the generation of sludge would have had a direct effect on its contribution to the overall contamination at the Baytown Site. Therefore, the historical data confirming a 70% reduction in overall separator sludge generation at the Baytown Site by 1957 compared to 1947 sludge generation levels[4] would likely have resulted in a comparable reduction in contamination resulting from the generation of separator sludge by 1957 at the Baytown Site as well. (Please also see Paragraph 6.d and 6.e below where I further discuss the correlation between sludge generation and contaminant contribution in regard to my rebuttal of Dr. Kittrell's flawed reliance on the scientific topic known as "Darcy's Law").

iii. In addition, the oil (both free-phase and emulsified) in the wastewater is also a significant, potential source of historical soils, ground water and

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[2] *Id.*

[3] *Id.* at 11-15.

[4] *Id.* at 11-13 (citing S. Brady. The Oil & Gas Journal. Mar. 3, 1958. Solids Waste Disposal. [BAYC-00013621 to BAYC-00013624]).

surface waters/sediment contamination throughout the Baytown Site. In regard to the refinery's historic waste processing system, wastewaters were conveyed to and treated in a number of the same or similar types of earthen waste units identified above, and therefore, the oils in the wastewaters may have contributed to the contamination at numerous locations at the Baytown Site. Therefore, Dr. Kittrell's claim that the historical data confirming a 90% reduction in oil content in the wastewater as a result of the installation and operation of the three pre-separators by 1958 "is not relevant to soil contamination at the master separator and its resultant remediation cost" or "to the entire Baytown refinery", Kittrell Declaration ¶ 10 at p. 8, is incorrect.

iv. Given the 90% reduction in the oil in the wastewaters by 1958 that was conveyed from the pre-separators to Separator 10 and other downstream waste units, this would result in a comparable reduction of the oil in the wastewater that was entering downstream waste units, and also result in the removal of potential contaminant source mass (both free-phase and emulsified oils, and dissolved phase hydrocarbons) that could release from a waste unit through which the wastewater was conveyed and contaminate the soil and ground water surrounding and beneath the waste unit.

v. Thus, these two process efficiency improvement factors employed by Mr. White in his allocation were valid, and should be viewed as reasonable surrogates for relating the pollution conditions associated with the production of refinery products.

b. Dr. Kittrell's criticisms, which Mr. Low relies upon, regarding these two process efficiency factors are not valid because Dr. Kittrell (1) fails to take into account how the design, construction and maintenance of the separators and other waste units during the wartime period as compared to the post-war period directly affected the nature and extent of releases of oil and other contaminants from the sludge and water in these waste units; and (2) applies a scientific concept - Darcy's Law - that lacks a contaminant contribution component, and for additional site-specific reasons is ill-suited for the purpose for which Dr. Kittrell employs it.

c. First, Dr. Kittrell fails to take into account how the design, construction and maintenance of the separators and other waste units during the wartime period as compared to the post-war period would have substantially exacerbated the buildup of sludge in the units and the release of oil and other contaminants in the sludge and wastewater in the units into the surrounding soils and ground water.

i. My Rebuttal Report described how during the wartime period the separators, Outfall Canals and other waste units were earthen surface impoundments, were not equipped with liners or sealed walls to prevent leaking, lacked continuous skimming or dredging equipment, and were

not subject to leak detection monitoring, and therefore, as a result their simple design and limited maintenance and monitoring resulted in a greater buildup of sludge in the separators and regular releases and leaks from not only the bottom of the units but from the sidewalls as well.

ii. Dr. Kittrell failed to take into account these key differences in the technical and operational aspects of the separators and similar waste units when comparing the wartime period to the post-wartime period. For example, in describing the operation of the oil/water separators, Dr. Kittrell states that "[t]he oil is skimmed off the top, and the sludge is scrapped off the bottom." Kittrell Declaration ¶ 13.f. However, as I noted above and in my Rebuttal Report, continuous skimming and dredging equipment was not installed in Separator 10 at the Baytown Refinery until the early 1950s. Rebuttal Report at p. 6. This implies that for a portion of its operational life, Separator 10 was not equipped with the necessary equipment to operate as described by Dr. Kittrell. Similarly, a review of wartime-era aerial photographs indicated a lack of skimming or scraping equipment on Separator 2 (SWMU 69)[5]. Settled solids would accumulate in Separator 2 until they were periodically removed and placed in the adjacent sludge pit (SMWU 59) for storage and disposal. Therefore, in the absence of skimming and dredging equipment, these separators would have had a commensurately greater amount of sludge buildup during periods, principally the wartime period, of greater sludge generation rates.

iii. In addition, given the condition and limited maintenance of these waste units, it is quite likely that contaminated wastewaters containing free-phase and emulsified oils and dissolved-phase constituents were regularly released from the units through cracks, voids, pore spaces or microfractures within the sidewalls of the units by hydrostatic pressure into the surrounding native strata via advective and dispersion/diffusion transport, and not merely through releases of oil and other contaminants through the bottom of the separators. Thus, the soil and ground water underlying and in the vicinity of the separator would have become contaminated as the result of releases of hazardous substances from <u>both the bottom and sidewalls of the separator</u>.

iv. In contrast, Dr. Kittrell expresses a narrow and inaccurate view of pollution effects from the separators by suggesting that the only potential source of environmental contamination is settled solids accumulated in the bottom of the unit. It is simply incorrect for Dr. Kittrell to disregard the fact that releases of free-phase or emulsified oils and/or hydrocarbon-affected wastewater through the sidewalls was a viable contaminant transport pathway to the soils and underlying ground water in the vicinity of the separators because releases of hydrocarbon-affected liquids

[5] ERM. Assessment of Petroleum Hydrocarbon Extent, Northwest Dock Area. ExxonMobil Baytown Refinery, Baytown, Texas. September 13, 2011. [BAYTECH-00122598]

within the separator through the unit's sidewalls can represent a significant source of contamination. Nevertheless, Dr. Kittrell elects to ignore this release mechanism and its resultant contamination stating that even if oil were removed by the pre-separators, this "is not relevant to soil contamination" at the separator where the wastewaters are subsequently conveyed. Kittrell Declaration ¶ 10.d. In fact, Dr. Kittrell contradicts his own findings, because in his declaration Dr. Kittrell acknowledges that contamination of the soils around the separator may have occurred "by dissolved oil and by suspended oil and sludge that creeps from beneath (<u>or through cracks</u>) in the oil/water separator into the surrounding soil." Kittrell Declaration ¶ 13.c (underline added). In his rebuttal report Dr. Kittrell also acknowledged that some oil and sludge may be retained in the wastewater effluent and transferred to downstream wastewater management units, such as the Outfall Canals, thereby serving as a source of contamination originating from these units. Kittrell Rebuttal Rpt. (Nov. 16, 2012) at p. 34.

d. Furthermore, Dr. Kittrell applies a scientific concept - Darcy's Law - that lacks a contaminant contribution component, and therefore, is ill-suited for the purpose for which Dr. Kittrell employs it; namely, Dr. Kittrell attempted to use Darcy's Law to determine whether and to what extent the sludge in the separators was a source of contamination of the surrounding soils and ground water.

   i. In his declaration, Dr. Kittrell opines that "the amount of sludge that is recovered from an oil/water separator is not useful as a metric for assessing the extent and amount of oil contamination that was remediated from around and below the refinery oil/water separators." Instead, according to Dr. Kittrell, the "science and engineering of 'flow through porous media' governs the calculation of the extent of soil contamination, and hence the cost of remediation of such a site" and that "[o]ne established method of making such calculations uses 'Darcy's Law'". Kittrell Declaration ¶ 13. However, Dr. Kittrell's claim that "Darcy's Law" can be used to describe the flow of contaminants through the earthen bottom and sidewalls of the separator to estimate the amount of resulting contamination in the underlying soils and ground water is not valid, and therefore, is not an appropriate method to calculate the extent of historical contamination attributable to certain time periods of the Baytown refinery's operation for the following reasons.

   ii. As an initial matter, the "topic" of "flow through a porous media" (as described by Darcy's Law) alone is not sufficient to estimate the resultant environmental contamination and subsequent remediation caused by releases from the Baytown Refinery oil/water separators to surrounding soils and ground water because Darcy's Law fails to take into account the potential contaminant contribution of the settleable solids in the separator.

iii. Darcy's Law describes fluid flow through a porous media and can be presented in an algebraic equation that includes terms for hydraulic conductivity, hydraulic gradient, and the cross-sectional area of flow. However, the equation does not include any term for contaminant concentration. While Darcy's Law is appropriate to estimate the rate at which fluids released from a refinery's oil/water separators move through the subsurface, it does not accurately predict how contaminants released from the separators move through and interact with the environment.

e. In any event, even if Darcy's Law was a valid approach for determining the contaminant contribution of the separators and similar waste units, Dr. Kittrell's use of Darcy's Law fails to take into account (1) the effect of the sludge in the separators, and more particularly, the greater amounts of sludge in the separators during the wartime period as compared to the post-1956 period; (2) the greater amounts of oil contamination in the sludge and the wastewater as well during the wartime period; and (3) how the 70% reduction in separator sludge generation between 1947 and 1957, and the 90% reduction in oil content in the wastewater by the mid- to late 1950s effected the contaminant contribution to the underlying soils and ground water by the separators and other downstream units, such as the Outfall Canals.

i. First, Dr. Kittrell incorrectly opines that the hydrostatic pressure head resulting from the contaminated water column atop the sludge in the separator "remains constant, regardless of the amount of sludge in the wastewater" throughout the operational life of the separator because "the depth of water in the oil/water separator ... remain[s] constant during the years of operation," and therefore, the release of oil and other contaminants from the separator to the surrounding soils and ground water also remains constant over the operational life of the separator. Kittrell Declaration ¶ 13.f. Dr. Kittrell bases this opinion on an erroneous assumption; specifically, Dr. Kittrell assumes that the amount of sludge at the bottom of the separator remains constant because "[t]he oil is skimmed off the top, and the sludge is scraped off the bottom." Kittrell Declaration ¶ 13.f. However, as discussed above the separators at the Baytown refinery lacked the requisite skimming equipment prior to the waste processing improvements in the mid-1950s that ensured the oil was regularly skimmed off the top and the sludge regularly scraped off the bottom. It follows then that during the period of time prior to the installation of continuous skimming and dredging equipment the pressure head in, for example, Separators 10 and 2 would have varied over time as sludge accumulated in the separator before it was removed. As described in the *Closure Plan for Spill Basin 1, Separators 3A and 3M, and the South Landfarm*, Separator 3M was used for the temporary storage and thickening of solids generated by the oil/water separators. Separated water (*i.e.*, supernatant) was continuously removed from Separator 3M

but settled solids were only periodically removed.[6] Based on the described use of Separator 3M, it is expected that during times of greater sludge generation rates, such as during the wartime period, Separator 3M would receive and store greater amounts of sludge. Coupled with the greater sludge generation rates and the resulting greater buildup of sludge in the separators during the wartime period, the depth of water in the separators was not constant, and therefore, the hydrostatic pressure was not constant throughout the separator's operational life. Given the preceding findings, Separators 10, 3M, and 2 did not operate with an approximately constant pressure head throughout their operational lifetimes as described by and relied upon by Dr. Kittrell in support of his position. Kittrell Declaration ¶ 13.f.

ii. Second, Dr. Kittrell's application of Darcy's Law fails to take into account that the greater amounts of sludge and the greater amounts of oil and other contaminants in both the sludge and the water column during the wartime period would have resulted in higher rates of contaminant contribution to the surrounding soils and ground water than during the post-waste processing improvements period. As discussed above, the installation of the pre-separators and numerous other process and waste processing improvements reduced the oil in the wastewaters by at least 90%, and therefore, the sludge settling in the separator, and the wastewater in the separator contained at least 90% less oil. Thus, as compared to the wartime period, by the mid- to late 1950s and subsequently, there was at least 90% less oily contaminants in the wastewater and sludge that was being released from the separator through cracks in the sidewalls and the bottom of the separator into the surrounding soils and ground water.

iii. Third, Dr. Kittrell's application of Darcy's Law fails to take into account the refinery's overall 70% reduction in separator sludge generation by approximately 1957 as a result of the process and waste processing efficiency improvements. When trying to estimate contamination caused by a release from an oil/water separator, it is important to understand the type and characteristics of the wastes managed by the separator and how those wastes varied over time. Higher concentrations of hazardous constituents (both petroleum hydrocarbons and heavy metals) are present in the waste materials (*i.e.*, sludge and free-phase and emulsified oils) managed in the bottom of the separators compared to the water overlying the sludge layer. As such, releases from a separator when more waste materials are present in a separator (*e.g.*, during periods of greater sludge generation and buildup) would result in more significant environmental contamination (as compared to periods of lesser sludge generation) because

[6] Exxon Company, U.S.A., et. al. Closure Plans for Spill Basin 1, Separators 3A and 3M, and the South Landfarm at the Baytown Refinery, Baytown, Texas. January 20, 1985. [BAYTECH-00095523]

- there is more sludge and free-phase and emulsified oils to be released from the separator;
- there is a greater amount of diffusion of hazardous constituents from the sludge and free-phase and emulsified oils into the soil surrounding the separators;
- there is a greater mass of hazardous constituents that can diffuse from the waste materials into the water phase that may be released from the separator so the water released from a separator would contain higher concentrations of hazardous constituents; and
- the wastewaters that are conveyed from the separator to downstream waste units, such as the Outfall Canals, contain more residual sludge, oil and oil-related contamination that cause additional soil and ground water contamination at downstream waste unit areas (*e.g.*, WMA-1 or Waste Management Area-1 is a significant area of ground water contamination that encompasses both the old separators area and the downstream Outfall Canals area).

In sum, Dr. Kittrell's application of Darcy's Law was inappropriate because Darcy's Law lacks a contaminant contribution component, and even if Darcy's Law was a valid approach, Dr. Kittrell application of Darcy's Law is riddled with erroneous assumptions and a failure to properly account for the greater amounts of sludge in the separators and the greater amounts of oil contamination in the sludge and wastewater during the wartime period, and the effect of post-wartime process and waste processing improvements, on contaminant contribution at the Baytown Site.

7. In Paragraphs 14 and 15 of Mr. Low's declaration, he acknowledges that the use of the refinery's annual crude throughput capacities coupled with "adjustment multipliers" "can be an acceptable [allocation] methodology", Low Declaration ¶ 15, but then opines that ExxonMobil's particular use of this methodology does not meet his criterion. However, as an environmental remediation expert familiar with how historical refinery operations cause or contribute to contamination, I disagree with this claim. From a technical perspective, the use of crude oil throughput as adjusted by waste processing efficiencies for determining annual waste or contaminant contributions is more accurate and preferable than a simple years-of-operation approach employed by Mr. Low in his proposed allocation methodology; I believe that a production-oriented approach would more accurately represent the environmental conditions of the refinery than merely a constant approach suggested by a straight-line "time-oriented" approach. In fact, in my Rebuttal Report I commented as follows:

> "[a]nnual crude oil throughput at the Baytown refinery, adjusted for the impacts for processing efficiencies, is a more appropriate basis for determining the waste contribution to the refinery's separators and outfall canals as well as for estimating the resultant contribution to contamination of soils and ground water at the Baytown refinery from these units than simply assuming the waste and environmental contamination contributions are equal

for each operating year during the period in question. Rebuttal Report at p. 3.

a. As I have noted in my Rebuttal Report, the historical empirical data established that the amount of waste (*i.e.,* sludge) generated at a refinery wastewater treatment unit can easily be expressed as a function of crude oil processed coupled with the implementation of waste processing improvements/efficiencies. As the amount of crude oil throughput processed by the refinery varies over the years of a refinery's operation, it serves as a proportional proxy for waste generation because refinery operations have been relatively homogenous as they relate to the distillation of crude oil for the manufacture of various petroleum products.

b. However, over time, and particularly shortly after World War II the refinery implemented a number of process efficiency improvements that either reduced the amount of waste generated by the refinery production operations or improved the efficacy of the waste processing units. In fact, during the 1950s Sidney O. Brady - a long-time Humble Oil chemical engineer - documented a number of post-war process improvements that were undertaken at the Baytown refinery, such as, for example, (1) segregating sanitary sewers to reduce oil-water emulsions and oil coated solids managed by the separators; (2) modernizing the main oil/water separator; (3) eliminating once-through salt water for cooling, which reduced the efficiency of the separators and generated more emulsions and solids during the separation process; and (4) installing the three pre-separators. Sidney O. Brady also compiled historical data regarding the waste reductions resulting from these improvements, such as, the 70% reduction in separator sludge generation between 1947 and 1957 and the removal of 90% of the oil content in the wastewaters by the pre-separators. And other historical data further confirmed the validity of these data points. In implementing a number of waste processing and process efficiency improvements, particularly shortly after the wartime period, this resulted in reducing both the sludge and the oil content of the wastewater, and less contaminant contribution to the surrounding soils and ground water. Rebuttal Rpt. at pp. 3-7.

c. In fact, the United States Environmental Protection Agency ("EPA") has itself recognized the relationship between waste quantities generated and crude capacity. EPA determined that there is a direct correlation between a refinery's crude oil throughput capacity and the amount of wastes generated by the refinery's operations. Thus, EPA concluded that the greater the crude oil capacity, the greater the amount of waste processed.[7]

8. In Paragraph 14 of his declaration, Dr. Kittrell inaccurately concludes that the ground water contaminant plume impacting the Tankfarm 3000 Area (formerly the Baytown Ordnance Works ("BOW")) at the Baytown Site was contaminated only by post-war sources.

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[7] U.S. Environmental Protection Agency. Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Petroleum Refining Point Source Category (Washington: GPO, 1974) at 60-68 [MISC-00016203 to MISC-00016581 at MISC-00016276 to MISC-00016284].

Kittrell Declaration ¶ 14. His conclusion is unsupported by the assessment activities and studies performed at the Baytown Site.

a. First, the initial assessment activities conducted in the BOW area were performed only to assess whether there was a significant, current source of the contamination; in fact, according to the assessment report the Tankfarm 3000 Hydrocarbon Source Investigation was conducted to "locate any on-going source of hydrocarbon release in the area of Tank Farm 3000[.]"[8] The assessment concluded that, while there were four potential then-current sources, these sources were not significant contributors to the light non-aqueous phase liquids ("LNAPL") contaminant plume impacting the ground water in this area of the Complex. Instead, the source of this ground water contamination was primarily historic in nature.

b. Second, the LNAPL contaminant plume in the former BOW area is present in a well-sorted, poorly graded, silty sand with low hydraulic conductivity - meaning that the potential migration of the LNAPL and associated dissolved phase plume is limited. The historical LNAPL thickness data for the monitor wells in the Tank Farm 3000 area has fluctuated over time, but the extent of the LNAPL plume has not extended beyond its historical maximum lateral extent. Therefore, LNAPL released in this area throughout the operational life of the Baytown Complex has not migrated substantially. Thus, the source of this ground water contaminant plume would indeed be historic in nature.

c. Third, the constituents in the ground water in the BOW/Tankfarm 3000 area are constituents that were common to the feedstocks or finished materials previously used and/or handled at the BOW. The plume constituents associated with the operations of the BOW during the period of federal involvement included naphtha, toluene, xylenes, kerosene, and reformate, as detailed below.

    i. <u>Naphtha</u>. Both virgin and CAT naphtha were key components in the manufacture of toluene at the BOW during the wartime period. The Commanding Officer of the BOW reported that, as of 1944, finished toluene was processed from the following feedstocks: (1) virgin naphthas resulting from the processing of 185,000 barrels per day ("B/D") of crude oil at Humble's Baytown refinery; (2) 1,400 B/D of Humble CAT naphtha; and (3) a limited amount of naphtha, toluene concentrate or toluene raffinate from other refineries.[9] Dr. Kittrell's assertion that these materials were "not associated with the BOW operation near Tank 3000", Kittrell Declaration ¶ 14.d., is thus contradicted by contemporaneous documents, and the presence of virgin and CAT naphtha in the ground

[8] Agreed Order (Docket No. 95-1078-IH W-E; July 26, 1995) [BAYTECH-00014442 to BAYTECH-00014451 at BAYTECH-00014447].

[9] History of the Baytown Ordnance Works, Supplemental Information, Vols. 1-A thru V-A, Basic History through December 31, 1943, p. 14 [BAYHIS-00017875].

water in the former BOW area[10] thus supports the other evidence that this area was contaminated during the wartime period.

ii. Xylenes. Xylenes were always a byproduct of toluene production at the BOW. During the latter half of the war, xylene demand increased and Humble also processed xylene at the BOW for sale to the Ordnance Department.[11] Thus, the presence of the xylenes in the plume in the former BOW supports the other evidence that this area was contaminated during the wartime period.

iii. Reformate. Reformate, which was also present in the plume, was a product of the BOW hydro-former unit. The hydro-former unit stabilized and produced reformate containing toluol, which was later extracted through further processing.[12] The presence of reformate thus also supports the other evidence that the BOW area was contaminated during the wartime period.

iv. Kerosene. The BOW's Sulphur Dioxide Extraction Plant used 35,000 barrels of kerosene wash oil per stream day.[13] The presence of kerosene (in five of the twelve 1992 well samples and in concentrations from 2 to 100%) thus further supports the other evidence that the BOW area was contaminated during the wartime period.[14]

v. Toluene. Finally, toluene - the substance the BOW was designed and constructed to produce as its main product - was present in eleven of the twelve 1992 well samples.[15]

d. Additionally, Dr. Kittrell asserts that the PCB-contamination in the Tankfarm 3000 area was deposited after the wartime period. Currently, however, there are no on-going ground water PCB remediation activities at the ExxonMobil Baytown Chemical Plant, and therefore, any PCB contamination is not relevant to the issue of the source of the ground water contamination that the company is incurring substantial costs to address.

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[10] M.C. Bulawa, Characterization of Hydrocarbon Samples Recovered From Underground Wells, November 28, 1994 [BAYTECH-00045802 to BAYTECH-00045812 at BAYTECH-00045807].

[11] History of Baytown Ordnance Works [BAYHIS-00017747 to 17749]. *See also* History of Baytown Ordnance Works, Supplemental Information, Vols. 1-A thru V-A, [BAYHIS-00017870].

[12] M.W. Kellogg, Contract for Construction of a Hydroformer Plant, 1940 pp. 2-3 [BAYHIS-0007604 to 7605].

[13] Major, John T. Morgan, Area Engineer, Completion Report on Construction of BOW, p. 2 [BAYHIS-00016990].

[14] ERM. Tank Farm 3000 LNAPL Analyses (Jan. 14, 2002) [BAYTECH-00045791 to BAYTECH-00045821 at BAYTECH-00045797].

[15] ERM. Tank Farm 3000 LNAPL Analyses (Jan. 14, 2002) [BAYTECH-00045791 to BAYTECH-00045821 at BAYTECH-00045807].

9. I declare that the foregoing is true and correct under penalty of perjury of the laws of the United States. Executed on January 21, 2014.

Peter J. Gagnon

Attachment 1

Peter J. Gagnon, P.E., BCEE

Senior Partner

Mr. Gagnon has over 18 years experience in environmental engineering including site assessment and remediation, stormwater and wastewater discharge permitting and air emission calculations. His design projects have included ground water recovery and treatment systems, excavation of affected soils, capping, stormwater management and industrial wastewater treatment. He has directed numerous subsurface investigations at various industrial sites using CPT-ROST, direct-push, hollow-stem auger, air and mud rotary drilling. Mr. Gagnon's air experience has included regulatory applicability and compliance assessments and permit applications. He has also completed state and federal stormwater and industrial wastewater permit applications, risk assessments and response action plans for industrial sites along the U.S. Gulf Coast.

Publications

Ostendorf, D.W., DeGroot, D.J., Pollock, S.J., and Gagnon, P.J. 1995. Aerobic Acetate Degradation near the Capillary Fringe of Roadside Soil: Field Simulations from Soil Microcosms. Journal of Environmental Quality, 24:334-342.

Holmes, L., Rinas, R., Goyette, H., and Gagnon, P. September 18, 2006. Site Remediation MACT – Compliance Strategies for a Cross-Media MACT. 2006 NPRA Environmental Conference.

Registration and Certification

- Licensed Professional Engineer in the States of Texas and Montana
- Board Certified Environmental Engineer in Hazardous Waste Management by the American Academy of Environmental Engineers
- Licensed Leaking Petroleum Storage Tank Corrective Action Project Manager in the State of Texas

Fields of Competence

- Program and project management
- Civil and environmental engineering
- Site investigation and remediation
- RCRA
- Site Remediation MACT
- Risk assessment (human heath and ecological)
- CERCLA
- Multi-media permitting and regulatory compliance assessments

Education

- Master of Science, Environmental Engineering, University of Massachusetts at Amherst (1994)
- Bachelor of Civil Engineering, Villanova University (1992)

Professional Affiliations

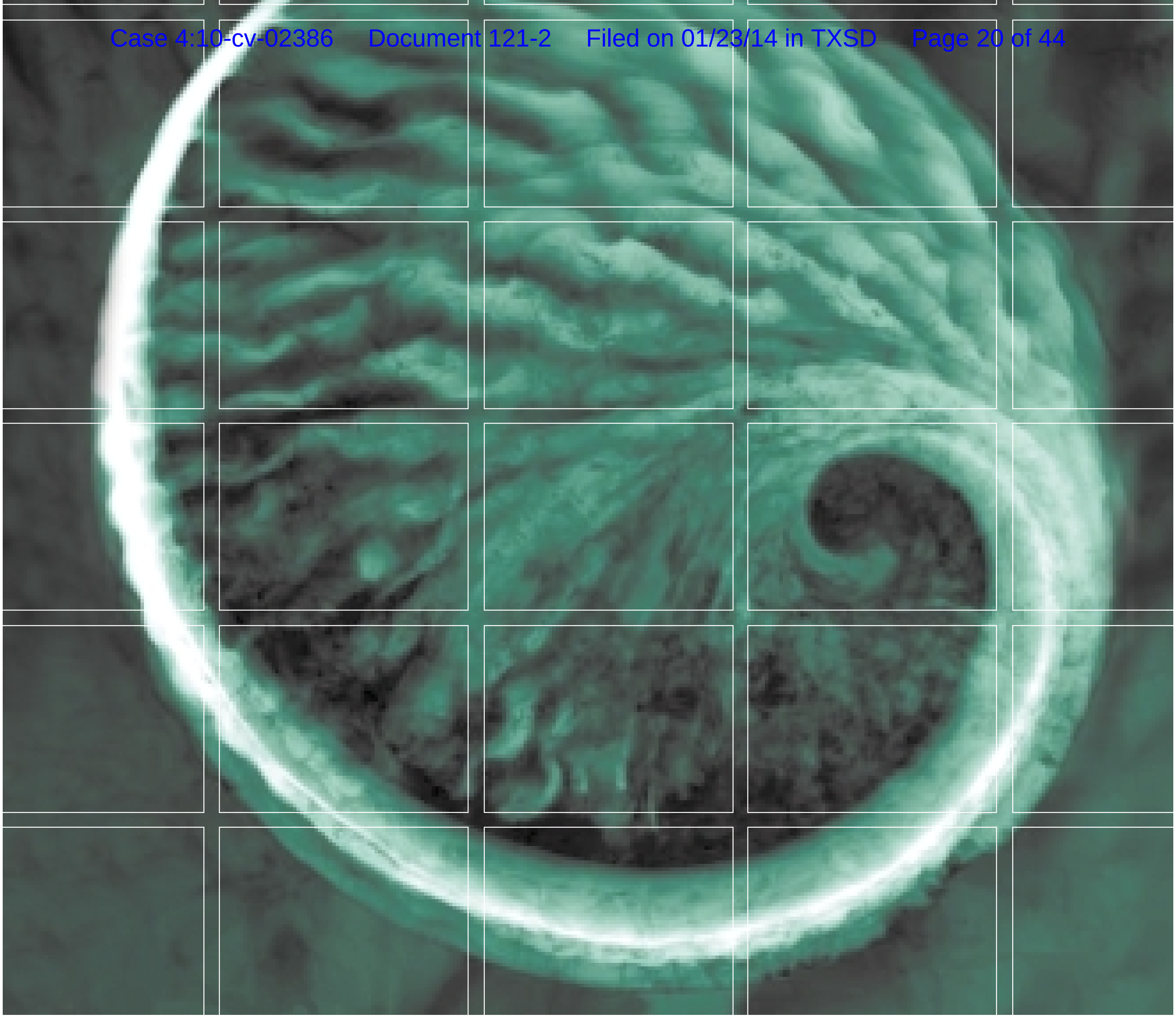
- American Academy of Environmental Engineers

Key Projects

- Partner-in-Charge for assessment, monitoring, and remediation activities at two major Texas Gulf Coast integrated refinery / chemical plant complexes and a refinery in Montana. Ground water monitoring activities were conducted to maintain compliance with requirements of the negotiated enforcement orders and RCRA. Assessment activities were conducted in the context of a prioritized RCRA Facility Investigation as well as to address newly discovered releases. Remediation activities included ground water remediation systems, monitored natural attenuation programs, excavation, and soil covers as required by negotiated enforcement orders and RCRA. Remediation activities complied with Site Remediation MACT, as applicable.
- Prepared technical justifications and RCRA Permit modifications utilizing EPA's *Contained-in-Policy* and site-specific data for the risk-based clean closures of permitted hazardous waste management units at refineries in Montana and Texas. In both cases the agency-approved approach eliminated the need for post-closure care. Ultimately one client redeveloped a former landfarm to accommodate part of a new process unit while the other client realized over $8 million in cost savings by eliminating the need for an engineered closure and long-term monitoring of a surface impoundment.
- Partner-in-Charge for a project involving on-going compliance of a permitted hazardous waste landfarm at a major petroleum refinery in Texas. Prepared RCRA permit modifications and provided ongoing consulting regarding Permit requirements.
- Partner-in-Charge for preparation of a RCRA permit renewal application for a major petroleum refinery in Texas. The permit application included five units in Detection Monitoring, one unit in corrective action, and over 90 other waste management units.
- Served as design engineer for the implementation of the various remedial elements in the EPA-approved ROD for the Tex Tin Superfund Site in Texas City, Texas. Design responsibilities included preparation of text, design drawings and engineering analyses for the Remedial Action Work Plans and Construction Quality Assurance Plans for the various Work Packages included in the phased design/build approach used at the site.
- Partner-in-Charge for preparation of a successful EPA Region 6 petition to delist the leachate generated by an active land treatment unit (an F039 hazardous waste) at a major petroleum refinery in Texas.
- Managed a RCRA corrective action program at a litigiously sensitive former wood treating facility in a low income residential area of Houston, Texas. Directed activities necessary to maintain compliance with the site's RCRA Permit and Compliance Plan. Provided leadership to technical teams for the investigation of DNAPL in a highly complex hydrogeologic setting, assessment of risk and the evaluation of potential remedial alternatives in accordance with RCRA and TRRP.
- Designed and implemented the corrective measures for a Site-wide Remedy at a chemical plant near Mobile, Alabama including source removal (excavation) and source reduction (*in situ* chemical oxidation) which allowed the termination of a ground water pump-and-treat system that had operated at the plant for over 20 years.
- Directed and managed numerous site assessments that utilized a variety of techniques to delineate the extent of affected environmental media at multiple locations throughout the U.S. Gulf Coast region including sites impacted with pesticides, herbicides, metals, solvents, and various petroleum hydrocarbons (including LNAPLs and DNAPLs).
- Directed the completion of risk assessments to evaluate the potential risks associated with the exposure of human and environmental receptors to affected media under various exposure scenarios for industrial sites along the U.S. Gulf Coast.
- Completed Response Action Plans/Corrective Measures Studies under various regulatory programs to evaluate remediation technologies to achieve response action objectives.
- Conducted recoverability assessments for NAPL plumes at two Texas Gulf Coast refineries using site-specific data and the models included in API Publications. Residual NAPL saturation, volumes of readily recoverable NAPL, and temporal variation of NAPL recovery rates were estimated while also assessing the fate and transport of the associated dissolved phase plumes.

- Served as Lead Assessor for an audit team reviewing all aspects of a Texas refinery/petrochemical complex's compliance with Site Remediation MACT. The audit included recommended solutions designed to maintain long-term compliance.
- Completed Site Remediation MACT applicability determinations for seven refineries (located in Texas, California, and St. Croix) and two chemical plants (located in Texas and Arkansas). As part of these determinations, assessed various remediation system components and activities subject to emission controls and provided methods of achieving compliance including modifying existing facility procedures, developing Site Remediation MACT-compliant Sampling and Analysis Plans, and Soil Management Plans.
- Developed a spreadsheet-based tool for use by a major energy corporation to assess the applicability of Site Remediation MACT at its 16 U.S. refineries. Subsequently conducted an internet-based training session for corporate and facility personnel to demonstrate the use of the tool and the MACT requirements. Completed applicability assessments and assisted in developing and documenting compliance strategies at four of the client's Texas refineries.
- Trained over 100 employees over a three-day period at a refinery in the U.S. Virgin Islands on the implementation of new or updated procedures designed to maintain the refinery's compliance with Site Remediation MACT.
- Managed remedial and investigative activities at multiple gasoline retail facilities in Houston and Austin, Texas. Responsibilities included client and agency interaction and coordination of day-to-day activities.
- Directed routine ground water monitoring activities for a portfolio of LPST sites in Houston and Austin. Tasks included coordinating sampling activities, verifying field and laboratory analytical data, inferring data trends, constructing potentiometric surface maps, and isoconcentration maps and completing required reports.
- Directed numerous subsurface investigations at LPST sites in the Houston, Texas area in compliance with State requirements and was responsible for preparing the reports for submittal to the client and the state regulatory agency.
- Directed the completion of risk assessments to evaluate the potential risks associated with the exposure of human and environmental receptors to affected media under various scenarios for industrial and gasoline retail sites in Texas.
- Directed and oversaw the removal of 11 UST systems at gasoline retail facilities in the Houston, Texas area.
- Designed ground water and LNAPL recovery systems utilizing pneumatic and electrical pumps for facilities Midland, Houston, Baytown, and Conroe, Texas. Additionally, constructed ground water recovery and treatment systems at locations in Ft. Worth and Dawson, and Houston, Texas.
- Prepared design drawings and construction specifications to cover petroleum hydrocarbon affected soils from a former surface impoundment with a 3-acre reinforced concrete parking lot.
- Developed design drawings and specifications and oversaw the excavation of over 9,000 cubic yards of affected soil at a former pesticide blending facility near Waco, Texas.
- Managed preparation of an Activity Characterization Report required to approve the operation of a floating production, storage, and off-loading type unit for the production of oil and gas from up to seven wells off the coast of Brazil.

Attachment 2



ExxonMobil Corporation vs. United States of America:

Rebuttal Report of Peter J. Gagnon

December 20, 2012

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ExxonMobil Corporation vs. United States of America: *Rebuttal Report of Peter J. Gagnon*

December 20, 2012

Project No. 0147586

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1.0 INTRODUCTION

I was retained by Baker Botts, LLP on behalf of ExxonMobil to serve as an expert rebuttal witness in the actions identified below.

This report rebuts portions of the reports prepared by James R. Kittrell, Ph.D., entitled, "Expert Report: Historical Operations of Exxon's Baytown and Baton Rouge Refineries with Implications Regarding Contributions to Site Contamination," dated August 10, 2012 and "Rebuttal Report: Rebuttal to the Reports of Mr. J.M. Johnson, Mr. A.J. Gravel and Mr. R.L. White," dated November 16, 2012. This report also presents rebuttal points relating to the opinions of Matthew A. Low in his reports entitled "Expert Report on Allocation with Respect to Exxon's Baytown and Baton Rouge Refinery and Chemical Complexes," dated August 10, 2012 and "Expert Rebuttal Report on Allocation with Respect to Exxon's Baytown and Baton Rouge Refinery and Chemical Complexes," dated November 16, 2012.

The information and rebuttal opinions presented in this report are based on information available to me and analysis conducted as of December 20, 2012. I reserve the right to supplement this report as needed. A list of the documents relied on in forming my rebuttal opinions is included in Appendix A.

This report is submitted for the following matters, *ExxonMobil Corporation v. United States of America* S.D. Tex. H-10-2386 and H-11-1814; and *ExxonMobil Corporation v. United States of America* Ct. Fed. Cl. 09-165-C and 09-882-C.

2.0 QUALIFICATIONS

I am a Senior Partner with Environmental Resources Management (ERM), a leading global provider of environmental, health, safety, risk, social consulting, and sustainability services. I graduated from Villanova University in Villanova, Pennsylvania with a Bachelor of Civil Engineering in 1992 and obtained a Master of Science in Environmental Engineering from the University of Massachusetts in Amherst, Massachusetts in 1994.

I have over 18 years of professional experience as an environmental consultant with ERM, primarily in the area of site assessment and remediation at industrial sites (including refineries, chemical plants, *etc.*) for private sector clients. Most of the sites at which I have worked are located in the States of Texas, Louisiana, Alabama, and Montana.

I am a licensed Professional Environmental Engineer in the states of Texas and Montana. In addition, I am a Board Certified Environmental Engineer by the American Academy of Environmental Engineers in the specialty area of Hazardous Waste Management. I have been working on various environmental assessment, remediation, and compliance projects at the ExxonMobil Baytown Complex since approximately 2003. Initially working as a Senior Project Engineer and Senior Project Manager for these projects, I became Partner-in-Charge for all of ERM projects at the Baytown Complex in 2007. As Partner-in-Charge, I am responsible for directing a team of engineers and scientists during assessment, monitoring, and remediation activities at the ExxonMobil Baytown complex to maintain compliance with requirements of the negotiated enforcement orders, permits, and state and federal regulations. A copy of my resume is included in Appendix B.

ERM was compensated at a rate of $218 per hour for my time in conducting research and analysis as well as for preparing this report.

3.0 REBUTTAL OF DR. J. KITTRELL

Rebuttal Opinion 1: **Annual crude oil throughput at the Baytown refinery, adjusted for the impacts for processing efficiencies, is a more appropriate basis for determining the waste contribution to the refinery's separators and outfall canals as well as for estimating the resultant contribution to contamination of soils and ground water at the Baytown refinery from these units than simply assuming the waste and environmental contamination contributions are equal for each operating year during the period in question.**

Dr. Kittrell contends that the separators and outfall canals (the units) at the Baytown refinery were "pass-through units" because accumulated sludges were periodically removed from the units and therefore only a portion of the sludge is available to contaminate the soils underlying the units since "The extent of soil contamination will be dependent principally on the time duration that the waste remains in contact with the soil …". Therefore, the amount of contaminated soil beneath the units are not proportional to the amount of crude oil processed in the refinery over the years, but rather the duration of exposure, or the period of operation of the unit where each year is treated equally (Kittrell pp. 39-40). It should be noted that Dr. Kittrell does not appear to actually review and consider the specific historical or technical reports for Separators 3M and 10, as his opinion is based on the conceptual operation of separators.

As documented by Perkins[1] the amount of waste (i.e., sludge) generated at a refinery wastewater treatment unit can easily be expressed as a function of crude oil processed coupled with the implementation of waste processing improvements/efficiencies. Brady[2] describes some of these process improvements at the Baytown refinery including

- segregating sanitary sewers to reduce oil-water emulsions and oil coated solids managed by the separators in 1949;
- modernizing the main oil/water separator in 1950;
- eliminating salt water for cooling, which acted to stabilize emulsions and prevent gravity separation of both oil and sediment in the separator (c. 1950); and
- installing a trunk sewer to transfer drainage from the west side of the refinery to the oil/water separator, in lieu of discharging to Mitchell Bay via the earthen separator which operated prior to 1950. (Note: the area of this earthen separator is currently referred to as Solid Waste Management Unit 69.)

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[1] Perkins, Jody. An Historical Overview of Solid Waste Management in the Petroleum Industry: Discussion Paper #062. October 1990. p. 12. [MISC-00010303]

[2] Brady, S.O. *Effluent improvement Program at Humble's Baytown Refinery.* Proceedings of the Ninth Industrial Waste Conference. May 1954. pp. 98 – 106. [BAYC-00013617]

In this way the waste generated during the refining process, managed by land-based surface impoundments (*e.g.*, the outfall canals) or separators, and which subsequently contributed to environmental contamination can be directly attributed to the amount of crude oil processed by the refinery (as tempered by upstream processes efficiencies).

Waste generation rates at a refinery can vary over time; therefore, application of a standard uniform rate per unit of time does not account for this variation. Rather, crude oil throughput serves as a proportional proxy value for waste generation. In turn, crude oil throughput serves as a more legitimate measure of the resultant soil and ground water contamination caused by the waste management units.

Further, accumulated sludges are not the only potential source of environmental contamination from the Baytown refinery separators and outfall canals as Dr. Kittrell implies in pages 39 – 40 of his report. Early surface impoundments (*e.g.*, the in-ground separators and outfall canals at the Baytown refinery) installed at oil refineries along the U.S. Gulf Coast were built prior to the development of present day standards. As a result, releases of oil, water affected with dissolved phase hydrocarbon constituents, and residuals (*e.g.*, sludges, sediments, emulsions, and other higher density hydrocarbon-laden materials) from the units were introduced into the environment (i.e., soils and ground water).

Early surface impoundments were not installed with liners or sealed walls to prevent leaking. Further, leak detection systems were not developed or in use during the early years of refinery operations. In short, early oil/water separators were earthen pits (potentially equipped with concrete sidewalls) with limited ancillary equipment. Because of their relatively simple design, maintenance procedures were typically limited to the mechanical elements of the separators and outfall canals (*e.g.*, pumps, piping, weirs, *etc.*) or the removal of accumulated residuals from the bottom. Dr. Kittrell speculates that period storm events resulting in high storm water flow would remove accumulated sediments from the outfall canals [p. 39] but offers no quantitative analysis of the required scouring velocity to mobilize these materials or if said scouring velocity could theoretically have been achieved. No historical or scientific evidence has been presented to substantiate his claim.

Maintenance procedures were not typically implemented to identify and repair potential cracks, fractures, voids or other features that might allow the release of liquids through the sidewalls or floor of the separator. In simple terms, leaks were expected and accepted provided the unit continued basic operation. As a result, once a release began it could continue unchecked as the unit continued to manage wastewaters laden with hazardous constituents until there was a catastrophic event (*e.g.*, fire, structural failure, etc.) or until the unit was permanently taken out of service. Releases could continue for years or decades during which time various hazardous constituents would leach into the soils and ground water immediately proximate to the unit. Therefore, as the refinery processed increasing amounts of crude oil (without improving upstream waste processes) more oils, emulsions, and sludges entered the units and subsequently

were released to surrounding soils and ground water. Furthermore, over time, ground water affected by such releases could flow downgradient[3] via gravity to nearby surface water bodies threatening ecological receptors though impacts to sediments and surface water. However, as upstream waste processes improved, so did the quality of the wastewaters managed resulting in lower contributions of contaminant mass to the environment.

Releases to the environment can occur from an in-ground oil/water separator or any downstream surface impoundment managing similar materials (*e.g.*, the Outfall Canals at the Baytown Refinery) in any direction. By design, during routine operations oil floats atop the water within an oil/water separator. However, emulsified oils are typically present throughout the entire water column within the unit (or in downstream units). The free-phase and emulsified oil and dissolved-phase constituents can migrate through cracks, voids, pore spaces, or microfractures within the walls of the unit into the surrounding native strata via advective and dispersion/diffusion transport.

Liquids (either water or oils) leaking through the sidewalls and/or floor of the unit enter the soil and are transported laterally away from the unit due to the hydrostatic pressures exerted by the liquids remaining in the unit. This pressure overcomes the entry pressure present within the soil pores and can continue pushing the liquids outwards in all directions (*i.e.*, 360 degrees centered about the separator in the horizontal plane and 180 degrees in the vertical plane). In hydrogeologic terms the leaking unit acts as a ground water mound. In addition, the liquids will travel vertically downward under the force of gravity. This movement of liquids advectively transports contaminant mass away from the separator and into the native soils toward ground water. In addition, due to concentration gradients, constituents will also move via dispersion and diffusion from areas of higher concentration (*i.e.*, contaminated locations) to those of lower concentration (*i.e.*, uncontaminated locations) in the surrounding soil and ground water matrix.

In addition, residuals accumulate in the floor of operational oil water separators during normal operating conditions. These more viscous fluids can also leak through cracks or microfactures into the native strata surrounding the separator. The hydrostatic pressure induced by the water column atop the accumulated solids will act as a driving force overcoming the pore space entry pressures as described above. In units managing a higher percentage of solids versus liquids (*e.g.*, sludge pits) the same release mechanisms apply. Hazardous constituents will leach from the solid and semi-solid materials within the unit to the surrounding native soils.

Thus, contamination arises not only from the sludges themselves but also from the impact of these pressures on the adjacent soils. These soils would be required to be remediated under RCRA procedures. Because of the multiple

[3] ERM. Unit-Specific Hydrogeology and Ground Water Monitoring Systems – Waste Management Area-1 (WMA-1). ExxonMobil Baytown Refinery, Baytown, Texas. April 14, 2010. pp. 1 – 17. [BAYC-0089421-89494]

potential release point (*i.e.*, sidewalls and floor) and because the volumetric flow rate managed by the Baytown refinery's oil/water separator and outfall canals are directly related to the facility's operations, crude oil throughput is a reasonable and appropriate basis for estimating the contaminant mass released into the environment over time. In the absence of mechanisms limiting the source and impact of contamination, one would expect that periods of high throughput would contribute more contaminant mass to the environment resulting from the processes described above. Consequently, an allocation of contamination on a pure time of operation basis would clearly fail to account for the variability in contamination that was caused by both the variation in effluent load and the efficiency of pollution control equipment that existed from one year to the next.

An additional contributing factor to the spread of contamination from an in-ground surface impoundment is the amount of oil and sludge entering and accumulating in the unit. A unit that manages greater volumes of emulsified or separate phase oil and/or sludge would have a proportionally greater resultant contamination. As mentioned above, the hydrostatic pressures within the separator will force liquids through the sidewalls and floor. If these liquids contain oils or hazardous constituents, they will likewise be released from the unit. If, however, proactive management techniques reduce the amount of wastes managed by the unit, the amount of new releases contributing to environmental contamination would decrease. As documented by the Humble Oil Refinery Loss Committee[4] numerous projects were implemented in the early 1950s to reduce wastes including (but not limited to):

- segregating sanitary wastes and constructing a separate treatment plant;
- constructing the effluent filtration unit;
- eliminating use of salt water for cooling;
- installing continuous skimming and dredging equipment in Separator 10;
- replacing Separator 1 with a preseparation flume; and
- installing a sewer to eliminate Separator 2 (a.k.a. SWMU 69).

Although detailed environmental forensics were not conducted at the time of their closures, the closure and clean-up of separators 3M and 10 included the removal of not only accumulated residuals but also the excavation of tons of contaminated soils. In addition, due to releases from these units to ground water ExxonMobil continues to operate a ground water corrective action system to contain, remove, and treat contaminated ground water in Waste Management Area-1 (which includes, among other units, former Separator 3M) and in the Dock Area around the location of the former Separator 2/Slush Pit.
The American Petroleum Institute (API) has documented that source reduction techniques dramatically reduced the amount of separator sludge generated (per barrel of crude oil) at the Baytown refinery from the 1940s to the 1960s [Perkins,

[4] Humble Oil & Refining Company – Refinery Loss Committee. Minute of the 22nd General Meeting. March 31 – April 4, 1952. pp. S-8-2 – S-8-21. [MIS-00031630]

1990]. It follows then, that the resultant contamination from former separators 3M and 10 would be greater during the World War II time period since the units were managing greater amounts of free oil, emulsified oil, and hydrocarbon-affected liquids, solids, and sludges. In turn, there was more material that would be released to the environment, contaminating the surrounding soils and contributing to the resultant ground water contamination still present at the site.

Additional Rebuttal Points – Dr. J. Kittrell

1. In his November 16, 2011 report Dr. Kittrell argues against the use of the waste processing efficiency improvement factors employed by allocator Mr. Richard White in his proposed allocation (Kittrell pp. 29 - 42)

Dr. Kittrell mischaracterizes a statement made by Mr. White in his initial report when Dr. Kittrell sates on page 32 of his rebuttal report that "Mr. White assumes that the addition of pre-separator to the Baytown Refinery collectively reduced separator waste production (settled solids) by 90% …" In referring to a 1964 Humble Oil engineering report Mr. White actually states that the installation of three pre-separators upstream of Separator 10 resulted in a 90% reduction in the oil content entering Separator 10 (White, p. 40). By mischaracterizing Mr. White's statement, Dr. Kittrell narrowly focuses on sediments as the only potential release mechanism from the separators and dismisses the potential release of liquids from the separators sidewalls.

As described in my Opinion 1 herein, Dr. Kittrell expresses a far narrower view of pollution effects from the separators by suggesting that the only potential source of environmental contamination is settled solids accumulated in the base of the unit. Environmental contamination caused by releases from separators such as Separator 10 are not solely associated with settled solids. Rather, releases of hydrocarbon-affected liquids within the separator through the unit's side walls can represent a significant source of contamination. Dr. Kittrell elects to ignore this release mechanism and its resultant contamination stating that even if oil were removed by the pre-separators, this "…has no effect on soil contamination." (Kittrell, p. 37). On page 34 of his report, Dr. Kittrell also states that "… the contamination of the soil beneath the separator arises from the sludge accumulating on the bottom of the (in this case un-lined) separator." It is not clear why Dr. Kittrell does not consider free phase oil and/or hydrocarbon-affected water as a potential source or releases through the unit's sidewalls as a viable contaminant transport pathway.

Dr. Kittrell does acknowledge, that some oil and sludge may be retained in separator effluent and transferred to subsequent downstream wastewater management units (e.g., the Baytown Refinery outfall canals) thereby serving as a source of contamination to these units.

A reduction of oil entering Separator 10 would result in the removal of potential source mass (both free phase and dissolved phase hydrocarbons) that could release from the unit and contaminate the soil and ground water surrounding and beneath the unit. Furthermore, it would result in a reduction of the oil and sludge exiting the unit and entering the Outfall Canals. Therefore, use of a

reduction factor for estimating environmental contamination resulting from unit operations subsequent to process efficiency improvements is appropriate. The reduction factor utilized by White comes from an engineering report prepared shortly after installation of waste reduction measures.

4.0 REBUTTAL OF MR. M. LOW

Rebuttal Opinion 2: **Leaks and spills from process operations served as a source of ground water contamination at the Baytown refinery, but are not the only source of these ground water plumes. Other significant sources of some of these plumes were historic waste units at or in the vicinity of currently recognized SWMUs. These waste units were only in operation for discrete time periods, and therefore crude oil throughput modified by waste processing improvements during their period of operation would be an appropriate basis to determine waste contribution. To the extent leaks, releases and spills from process operations were the source of the contamination, treating each year of refinery operations equally to determine waste contribution is also not appropriate because beginning in the late 1940s Humble Oil implemented an effluent improvement program to conserve oil and reduce waste generation.**

In his August 10, 2012 report, Mr. Low states that affected ground water plumes are not suspected to have been caused by a SWMU but by leaks and spills during routine refinery operations and that the record does not provide a basis to conclude that operational improvements impacted ground water (Low p 21.). I completely disagree with these statements.

There are several known free-phase hydrocarbon (a.k.a. phase separated hydrocarbons [PSH], light non-aqueous phase liquids [LNAPL], etc.) plumes and associated dissolved-phase hydrocarbon plumes at the ExxonMobil Baytown Refinery (BTRF). Many of these plumes were discovered during assessment activities required by the existing 1995 Agreed Order and the RCRA Permit and Compliance Plan. Four Agreed Order Plume Areas have been identified at the refinery, three of which are located south of Bayway Drive in a portion of the BTRF commonly referred to as the Dock Area. The fourth plume area is located north of Bayway Drive in the Tankfarm area. This fourth plume area is proximal to, but should not be confused with the Tankfarm 3000 Plume which is administered under a separate Agreed Order for the Baytown Chemical Plant.

Mr. Low does admit that releases to ground water may have occurred during wartime operations at the refinery. This is supported by a report that identified one of the contaminants in the refinery ground water plume to be blue-dyed avgas, which is consistent with the coloring of the avgas during the wartime period.[5] However, as an example of how an operational improvement can reduce leaks that contribute to ground water contamination, the Humble Oil Refinery Loss Committee reported that the implementation of a program of

[5] Wavro, Steven. Past Remedial Activities Report – Exxon Baytown Refinery. August 18, 1995. [BAYTECH-00013566]

cathodic protection for underground lines at the refinery (completed in 1952) resulted in a dramatic decrease (over 50% from 1949 to 1951) in leaks due to corrosion of underground lines[6].

In addition to the above-referenced LNAPL and dissolved phase plumes, similar plumes are present south of Bayway Drive in the area bounded by the Upper Outfall Canal (UOC) and the Lower Outfall Canal (LOC) in an area known as Waste Management Area-1 (WMA-1). Although some of the documented LNAPL plumes at the Baytown Refinery may be attributed with leaks and spills over the years of operation, Mr. Low is incorrect when stating none of the ground water plumes were caused by activity associated with a SWMU. SWMUs 59 and 69 (a.k.a. Separator 2) are located within the Dock Area and are co-located with Agreed Order Plume Area 3. Based on a review of aerial photographs and USGS topographic maps, SWMU 69 operated as a separator from sometime prior to 1927 to sometime between 1957 and 1962. The unit was apparently created by constructing a low dam across a natural drainageway leading to Mitchell Bay. Reportedly, the unit covered approximately 2.5 acres and was closed in 1977. However, aerial photographs show evidence that the unit was filled sometime between 1957 and 1962. The waste management activities did encompass a larger area than the separator proper and included a downstream outfall area. SWMU 59 appears to have been a sludge pit between approximately 1930 and 1947. A review of data from soil borings and monitor wells installed as part of the Agreed Order and RCRA Facility Investigation indicate that wastes from the operation of SWMUs 59 and 69 are still in place and that the wastes (along with past operations of the unit) have contributed to affected soils and ground water within the vicinity of the units.[7]

Furthermore, prior to refinery upgrades to the sewer system, an open drainage ditch (a.k.a. the West Ditch) conveyed process wastewater from the western side of the refinery, including the BOW, to SWMU 69. This apparent earthen drainage ditch carried oily waters from their point of generation to Separator 2. Releases and or leaks of free-phase and/or dissolved phase hydrocarbons would have impacted soil and ground water during the ditch's operational life, potentially including portions of Agreed Order Plume 4 in the refinery Tankfarm area. A review of available aerial photographs indicates that this ditch was filled in sometime around 1956.

WMA-1 includes former Separators 3 and 12 as well as the UOC and Wastewater Oxidation Unit (WOU). During the operational life of the separators and UOC, hydrocarbon-affected liquids (either water or oils), emulsions and sludges leaked through the sidewalls and/or floors, entered the soil and were transported vertically and laterally to ground water. Thus, these wastes from the managed units were directly responsible for the associated ground water issues. RCRA Corrective Actions were implemented and continue to be conducted

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[6] Humble Oil & Refining Company – Refinery Loss Committee. Minute of the 22nd General Meeting. March 31 – April 4, 1952. pp. S-8-22 – S-8-40. [MIS-00031630]

[7] ERM. *Assessment of Petroleum Hydrocarbon Extent, Northwest Dock Area*. ExxonMobil Baytown Refinery, Baytown, Texas. September 13, 2011. pp. 1 – 29. [BAYTECH-00122598]

pursuant to the TCEQ-issued Compliance Plan portion of the BTRF RCRA Permit.[8]

Because of the multiple potential release pathways (*i.e.*, sidewalls and floor) of the SWMUs (*i.e.*, SWMU 59/69, Separators 3 and 12, and UOC) and because the volumetric flow rate managed by these units is directly related to refinery operations, treating each year of refinery operations equally to determine waste contribution (and associated releases to the environment) is not appropriate because beginning in the late 1940s Humble Oil implemented an effluent improvement program whose purposes were to conserve oil and reduce waste generation. Thus, the amount of impacts on ground water contamination would be related to the implementation of process improvements. Since these units operated for discrete periods of time following the wartime years, process improvements reduced the amount of waste managed by those still in operation. Additionally, leak prevention activities (*e.g.*, the previously mentioned cathodic protection program for underground piping) resulted in a documented reduction in leaks from underground piping due to corrosion. Therefore, once again, use of crude oil throughput modified by the effect of waste processing improvements would be an appropriate way to determine the waste contribution from leaks, releases and spills over the period of operation, rather than treating each year equally. Waste contribution would not be accurately accounted for if only a year of operation factor was used.

Additional Rebuttal Points – Mr. M. Low

1. In his August 10, 2012 report Mr. Low states that: *"Based on the analysis of 12 samples by Exxon, contributions by units that were constructed after 1946 can be approximated to constitute as much as 33% of the plume assuming that the sample stations selected for analysis represent conditions in the plume and assume that the volume of hydrocarbons in each sample is equal."* (Low p. 23)

Assessment activities conducted at Baytown Chemical Plant Tankfarm 3000 Area (formerly the Baytown Ordinance Works [BOW]) and other areas of the Baytown Complex were conducted to achieve the requirements of the Texas Commission on Environmental Quality and its predecessor agencies. Their purpose was to assess the nature (i.e., constituents of concern) and extent (i.e., lateral and vertical) of affected environmental media. Limited to no forensic analysis was conducted to determine the vintage of the contamination. Therefore, there is limited to no scientific evidence to justify the application of any percentage to post 1946 releases without additional, extensive environmental forensic analysis. Thus, any of the assumptions made in the Low report regarding this calculation could not be made to justify the application of his proposed percentage. Because there was not a single, large spill event identified as the source of the hydrocarbon plume, the Tankfarm 3000 Hydrocarbon Source Investigation was conducted to *"locate any on-going source of hydrocarbon release in the area of Tank Farm 3000 and to abate the release."* The results of this work identified four

[8] ERM. Unit-Specific Hydrogeology and Ground Water Monitoring Systems – Waste Management Area-1 (WMA-1). ExxonMobil Baytown Refinery, Baytown, Texas. April 14, 2010. pp. 1 – 17. [BAYC-0089421-89494]

potential sources (one tank and three pipelines) but these sources were not believed to be significant contributors to the LNAPL plume, and that the source was instead primarily historic in nature.[9]

Furthermore, the LNAPL present in the area formerly known as the BOW is present in a well-sorted, poorly graded, silty sand. The low hydraulic conductivity of this ground water transmissive zone (~10^{-4} cm/sec), limits the potential migration of the LNAPL and associated dissolved phase plume (as demonstrated by the compendium of LNPAL thickness data). A review of historical LNAPL thickness data for the monitor wells in the Tank Farm 3000 area indicates that although thicknesses fluctuate over time, the extent of the LNAPL plume has not extended beyond its historical maximum lateral extent. Therefore, LNAPL released in this area throughout the operational life of the Baytown Complex has not migrated substantially. Thus, this plume indeed would be of an historic nature.

Lastly, it should be noted that the constituents of concern in ground water at the current Tank Farm 3000 area are constituents common to feedstocks or finished materials at the BOW. An analysis of the historical record appears to indicate that many plume constituents were directly associated with the operations of the BOW including naphtha, toluene, xylenes, kerosene and reformate which were feed stocks, products, by-products and/or wastes associated with the operation of the BOW during the period of Federal involvement.[10] A brief discussion outlining the connection of the various substances with BOW operations is provided below:

a. <u>Naphtha</u> – Virgin and CAT naphtha were key components used in the manufacture of toluene. These constituents and were present in: 1) six of twelve well samples analyzed in February of 1992; 2) all five well samples analyzed in November of 1993; and 3) two of four well samples analyzed in November of 1994. Of the twenty-one well samples analyzed, fifteen wells contained virgin or CAT naphtha and of those eight exhibited concentrations at or greater than 40 percent.[11]

The naphtha used at the BOW was taken from various crudes coming into the Baytown refinery, processed and only the cut containing a high percentage of toluene and compounds *"suitable for hydroforming"* was delivered to BOW.[12] As of 1944, the Commanding Officer at BOW reported that finished toluene at the BOW were processed from the following feedstocks: (1) total virgin napthas resulting from the processing of 185,000 barrels per day ("B/D") of crude oil at Humble's Baytown refinery, (2) approximately 1,400 B/D of Humble cracked

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9 Letter from J. M. Bruney, Exxon Chemical Americas to J.A. Saitas, TNRCC, "Hydrocarbon Source Investigation," July 23, 1998. [BAYTECH-00096190]

10 M.C. Bulawa, Characterization of Hydrocarbon Samples Recovered From Underground Wells, November 28, 1994 [BAYTECH-00045802-45812]

11 BAYTECH-00045807

12 Major, John T. Morgan, Area Engineer, Completion Report on Construction of BOW, p. 20, 72. [BAYHIS-00017008, 17060] BOW, Examination, July 7, 1943, p. 2. [BAYHIS-00025750]

naptha and (3) a limited amount of naptha, toluene concentrate or toluene raffinate from other refineries. The virgin naphtha, plus 1,400 barrels of cracked naphtha per day and other materials were sufficient to allow the BOW to produce toluene at its capacity rate of 67 million gallons per year.[13] The naphtha was used in various BOW units. For instance, the Distillation Unit had a naphtha charge capacity of 30,000 barrels per 24 hours. The Sulphur Dioxide Extraction Plant within the BOW was constructed and equipped with a two-stream capacity of 7,290 barrels per stream day of naphtha. The Hydroformer had a charge rate of 16,000 barrels of naphtha feed stock per operating day.[14] The BOW used virgin naphtha throughout most, if not all, its operational period.[15]

b. Xylenes – Xylenes which are also present in the plume, were manufactured in the BOW. As a part of the toluene production process, the heavy reformate stream containing most of the hydrocarbons boiling above toluene was redistilled to prepare a xylene concentrate stream that was returned to the refinery.[16] While xylenes were always a by-product of the toluene production, demand for xylenes increased substantially in the early 1940s and as a result the BOW embarked on a xylenes procurement program in 1943. At that time, the BOW began purchasing xylenes from Standard Oil Company of New Jersey ("SONJ"). A contract executed in September 1943 called for the BOW to purchase approximately 21 million gallons of xylenes.[17] These xylenes were synthesized simultaneously with toluene in the BOW hydro-former. Under the contract W-ORD-480, the crude synthetic xylenes as by-products of the toluene operation were finished by Humble to nitration grade and sold to SONJ who in turn sold the xylenes to the Ordnance Department.[18]

c. Reformate – Reformate which is also present in the plume, was a product of the hydro-former unit. The processes used in the hydro-former included stabilizing and ultimately producing reformate which contained toluol which was obtained through further processing.[19] Reformate was

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13 History of BOW, Supplemental Information, Vols. 1-A thru V-A, Basic History through December 31, 1943, p. 14. [BAYHIS-00017875]

14 Major, John T. Morgan, Area Engineer, Completion Report on Construction of BOW, p. 2. [BAYHIS-00016990]

15 In April 1945, responding to the demand for even more production, Humble explained the necessary steps to change BOW's virgin naphtha feedstock to cracked naphtha. See: Memorandum re Increase in Production of Hydroformed Aromatics Processing Cracked Naphtha at BOW, April 4, 1945. [BAYHIS-00016925 to 16929]

16 History of Baytown Ordnance Works [BAYHIS-00017747-7749]

17 History of BOW, Supplemental Information, Vols. 1-A thru V-A, Basic History through December 31, 1943, p. 9. [BAYHIS-00017870]

18 History of BOW, Supplemental Information, Vols. 1-A thru V-A, Basic History through December 31, 1943, p. 9. [BAYHIS-00017875]

19 M.W. Kellogg, Contract for Construction of a Hydroformer Plant. 1940, pp. 2-3. [BAYHIS-00007604 to 7605]

present in two of twelve well samples analyzed in February of 1992 and exhibited concentrations at or greater than 67 percent in those wells.[20]

d. Kerosene – Within the Sulphur Dioxide Extraction Plant, BOW used 35,000 barrels of kerosene wash oil per stream day.[21] Kerosene was present in five of twelve well samples analyzed in February of 1992 and exhibited concentrations ranging from 2 percent to 100 percent in those wells.[22]

e. Toluene – The BOW was designed and constructed to produce nitration-grade toluene as its main product. During WWII, the BOW produced a total of 239 million gallons of nitration-grade toluene which accounted for over 40 percent of all toluene manufactured from petroleum.[23] Toluene was present in eleven of twelve well samples analyzed in February of 1992 at varying amounts.[24]

2. Mr. Low references PCB contamination in ground water in his August 10, 2012 report. (Low p. 23)

There are no on-going ground water PCB remediation activities at the ExxonMobil Baytown Chemical Plant.

3. In his November 16, 2012 rebuttal report Mr. Low states that insufficient information is available to allocate future costs for remediation of Mitchell Bay and that this surface water body was "potentially affected by the Baytown Complex."

As required by TCEQ, ExxonMobil is completing an assessment of the soil, ground water and sediments associated with SWMUs 59 and 69. As described above, SWMU 69 (Separator 2) formerly discharged untreated industrial wastewater into Mitchell Bay. Recent and on-going assessment activities have identified on-shore soils, ground water, and off-shore sediments that are affected with similar petroleum hydrocarbons [25,26] and that the source of these hydrocarbons is SWMUs 59 and 69. As described above, these waste management units were operational during World War II. Releases from the

20 Baytech-00045807

21 Major, John T. Morgan, Area Engineer, Completion Report on Construction of BOW, p. 2. [BAYHIS-00016990]

22 Baytech-00045797

23 Charles S. Popple, Standard Oil Company (New Jersey) in World War II, 1952, p. 112-113 [MIS-00031867]

24 BAYTECH-00045807

25 ERM. *Assessment of Petroleum Hydrocarbon Extent, Northwest Dock Area*. ExxonMobil Baytown Refinery, Baytown, Texas. September 13, 2011. pp. 1 – 29. [BAYTECH-00122598]

26 Newfields. December 2011 Off-Shore Characterization Program: DART Installation and Core Extraction. Prepared for: ExxonMobil Environmental Services, Inc., Baytown, Texas. pp 1-8. [BAYC-0089495-89749]

units impacted soil and ground water on shore. Furthermore, because Separator 2 was historically in direct communication with Mitchell Bay, effluent from the Separator impacted sediments that are undergoing assessment and delineation. Ultimately, at the completion of the assessment and delineation of affected sediments, ExxonMobil will evaluate potential remediation alternatives and select a method to remediate the sediments affected by releases from the SWMUs.

4. In his November 16, 2012 rebuttal report Mr. Low disagrees with use of a 1985 endpoint for the allocation period at the Baytown Refinery. However, 1985 is a defensible, and in fact, a conservative endpoint for the relevant period of Baytown refinery operations in Mr. White's proposed allocation for the following reasons:

   a. RCRA compliance: By the mid-1980s RCRA required the refinery to comply with numerous hazardous waste management requirements, required closure of various surface impoundments, and permitting of all wastewater and other types of releases from the facility. Therefore, it is likely that any further new releases from refinery operations or the refinery waste processing system were minimal by 1985.

b. Additional reasons that are specific to relevant cost components:

   i. Separators 3M and 10 closed in 1985

   ii. South Landfarm received wastes from 1985 closure of Sep 3M and 10 and its closure costs are only allocated to wartime period on that basis

   iii. Upper Outfall Canal ceased receiving hazardous wastes in 1993, but Lower Outfall Canal ceased being used at all for wastewater conveyance in 1975. An assumed 1985 end date serves as a conservative mid-point

   iv. The relevant SWMUs ceased operation by 1985 and in fact most actually ceased operation a decade or more before 1985

   v. Early 1990s hydrocarbon source investigation determined that source of BOW ground water contamination was not due to any current release, but due to historical releases

   vi. Canals and separators and refinery ground water contamination is almost wholly in an area whose contamination sources would have been the canals, or separators that ceased operation or were closed in 1985 or prior to that date as detailed above

   vii. Mitchell Point and Mitchell Bay contamination is related to releases from waste units that ceased to operate by no later than the early 1960s.

Documents Relied On or Considered

Appendix A

December 20, 2012
Project No. 0147586

Environmental Resources Management
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
(281) 600-1000

Appendix B

Documents Relied Upon

Brady, S.O. *Effluent improvement Program at Humble's Baytown Refinery.* Proceedings of the Ninth Industrial Waste Conference. May 1954. [BAYC-00013617]

BAYHIS-00016925 to 00016929

BAYTECH-00045807

BAYTECH-00045797

Charles S. Popple, Standard Oil Company (New Jersey) in World War II, 1952, p. 112-113 [MIS-00031867]

ERM. *Assessment of Petroleum Hydrocarbon Extent, Northwest Dock Area*. ExxonMobil Baytown Refinery, Baytown, Texas. September 13, 2011. [BAYTECH-00122598]

ERM. Unit-Specific Hydrogeology and Ground Water Monitoring Systems – Waste Management Area-1 (WMA-1). ExxonMobil Baytown Refinery, Baytown, Texas. April 14, 2010. [BAYC-0089421-89494]

ERM. Revised RCRA Facility Investigation Work Plan for Twenty-Two Solid Waste Management Units. Exxon Company, U.S.A. Baytown Refinery, Baytown, Texas. June 15, 1998. [BAYTECH-00003336 - 3554]

Exxon Company, U.S.A., et. al. Closure Plans for Spill Basin 1, Separators 3A and 3M, and the South Landfarm at the Baytown Refinery, Baytown, Texas. January 20, 1985. [BAYTECH-00095523]

History of BOW, Supplemental Information, Vols. 1-A thru V-A, Basic History through December 31, 1943, [BAYHIS-00017747-7749]

Humble Oil & Refining Company – Refinery Loss Committee. Minutes of the 22nd General Meeting. March 31 – April 4, 1952. [MIS-00031630]

Letter from J. M. Bruney, Exxon Chemical Americas to J.A. Saitas, TNRCC, "Hydrocarbon Source Investigation," July 23, 1998. [BAYTECH-00096190]

Perkins, Jody. An Historical Overview of Solid Waste Management in the Petroleum Industry: Discussion Paper #062. October 1990. [MISC-00010303]

Major, John T. Morgan, Area Engineer, Completion Report on Construction of BOW, p. 20, 72. [BAYHIS-00017008, 17060] BOW, Examination, July 7, 1943, p. 2. [BAYHIS-00025750]

Major, John T. Morgan, Area Engineer, Completion Report on Construction of BOW, p. 2. [BAYHIS-00016990]

M.C. Bulawa, Characterization of Hydrocarbon Samples Recovered From Underground Wells, November 28, 1994. [BAYTECH-00045802-45812]

M.W. Kellogg, Contract for Construction of a Hydroformer Plant. 1940, pp. 2-3. [BAYHIS-00007604 - 7605]

Newfields. December 2011 Off-Shore Characterization Program: DART Installation and Core Extraction. Prepared for: ExxonMobil Environmental Services, Inc., Baytown, Texas. pp 1-8. [BAYC-0089495-89749]

Wavro, Stephen. Exxon Baytown Refinery - Past Remedial Activities Report. August 18, 1995. [BAYTECH-00013566]

Professional Profile

Appendix B

December 20, 2012
Project No. 0147586

Environmental Resources Management
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
(281) 600-1000

Peter J. Gagnon, P.E., BCEE

Senior Partner

Mr. Gagnon has over 18 years experience in environmental engineering including site assessment and remediation, stormwater and wastewater discharge permitting and air emission calculations. His design projects have included ground water recovery and treatment systems, excavation of affected soils, capping, stormwater management and industrial wastewater treatment. He has directed numerous subsurface investigations at various industrial sites using CPT-ROST, direct-push, hollow-stem auger, air and mud rotary drilling. Mr. Gagnon's air experience has included regulatory applicability and compliance assessments and permit applications. He has also completed state and federal stormwater and industrial wastewater permit applications, risk assessments and response action plans for industrial sites along the U.S. Gulf Coast.

Publications

Ostendorf, D.W., DeGroot, D.J., Pollock, S.J., and Gagnon, P.J. 1995. Aerobic Acetate Degradation near the Capillary Fringe of Roadside Soil: Field Simulations from Soil Microcosms. Journal of Environmental Quality, 24:334-342.

Holmes, L., Rinas, R., Goyette, H., and Gagnon, P. September 18, 2006. Site Remediation MACT – Compliance Strategies for a Cross-Media MACT. 2006 NPRA Environmental Conference.

Registration and Certification

- Licensed Professional Engineer in the States of Texas and Montana
- Board Certified Environmental Engineer in Hazardous Waste Management by the American Academy of Environmental Engineers
- Licensed Leaking Petroleum Storage Tank Corrective Action Project Manager in the State of Texas

Fields of Competence

- Program and project management
- Civil and environmental engineering
- Site investigation and remediation
- RCRA
- Site Remediation MACT
- Risk assessment (human heath and ecological)
- CERCLA
- Multi-media permitting and regulatory compliance assessments

Education

- Master of Science, Environmental Engineering, University of Massachusetts at Amherst (1994)
- Bachelor of Civil Engineering, Villanova University (1992)

Professional Affiliations

- American Academy of Environmental Engineers

ERM

Key Projects

- Partner-in-Charge for assessment, monitoring, and remediation activities at two major Texas Gulf Coast integrated refinery / chemical plant complexes and a refinery in Montana. Ground water monitoring activities were conducted to maintain compliance with requirements of the negotiated enforcement orders and RCRA. Assessment activities were conducted in the context of a prioritized RCRA Facility Investigation as well as to address newly discovered releases. Remediation activities included ground water remediation systems, monitored natural attenuation programs, excavation, and soil covers as required by negotiated enforcement orders and RCRA. Remediation activities complied with Site Remediation MACT, as applicable.
- Prepared technical justifications and RCRA Permit modifications utilizing EPA's *Contained-in-Policy* and site-specific data for the risk-based clean closures of permitted hazardous waste management units at refineries in Montana and Texas. In both cases the agency-approved approach eliminated the need for post-closure care. Ultimately one client redeveloped a former landfarm to accommodate part of a new process unit while the other client realized over $8 million in cost savings by eliminating the need for an engineered closure and long-term monitoring of a surface impoundment.
- Partner-in-Charge for a project involving on-going compliance of a permitted hazardous waste landfarm at a major petroleum refinery in Texas. Prepared RCRA permit modifications and provided ongoing consulting regarding Permit requirements.
- Partner-in-Charge for preparation of a RCRA permit renewal application for a major petroleum refinery in Texas. The permit application included five units in Detection Monitoring, one unit in corrective action, and over 90 other waste management units.
- Served as design engineer for the implementation of the various remedial elements in the EPA-approved ROD for the Tex Tin Superfund Site in Texas City, Texas. Design responsibilities included preparation of text, design drawings and engineering analyses for the Remedial Action Work Plans and Construction Quality Assurance Plans for the various Work Packages included in the phased design/build approach used at the site.
- Partner-in-Charge for preparation of a successful EPA Region 6 petition to delist the leachate generated by an active land treatment unit (an F039 hazardous waste) at a major petroleum refinery in Texas.
- Managed a RCRA corrective action program at a litigiously sensitive former wood treating facility in a low income residential area of Houston, Texas. Directed activities necessary to maintain compliance with the site's RCRA Permit and Compliance Plan. Provided leadership to technical teams for the investigation of DNAPL in a highly complex hydrogeologic setting, assessment of risk and the evaluation of potential remedial alternatives in accordance with RCRA and TRRP.
- Designed and implemented the corrective measures for a Site-wide Remedy at a chemical plant near Mobile, Alabama including source removal (excavation) and source reduction (*in situ* chemical oxidation) which allowed the termination of a ground water pump-and-treat system that had operated at the plant for over 20 years.
- Directed and managed numerous site assessments that utilized a variety of techniques to delineate the extent of affected environmental media at multiple locations throughout the U.S. Gulf Coast region including sites impacted with pesticides, herbicides, metals, solvents, and various petroleum hydrocarbons (including LNAPLs and DNAPLs).
- Directed the completion of risk assessments to evaluate the potential risks associated with the exposure of human and environmental receptors to affected media under various exposure scenarios for industrial sites along the U.S. Gulf Coast.
- Completed Response Action Plans/Corrective Measures Studies under various regulatory programs to evaluate remediation technologies to achieve response action objectives.
- Conducted recoverability assessments for NAPL plumes at two Texas Gulf Coast refineries using site-specific data and the models included in API Publications. Residual NAPL saturation, volumes of readily recoverable NAPL, and temporal variation of NAPL recovery rates were estimated while also assessing the fate and transport of the associated dissolved phase plumes.

- Served as Lead Assessor for an audit team reviewing all aspects of a Texas refinery/petrochemical complex's compliance with Site Remediation MACT. The audit included recommended solutions designed to maintain long-term compliance.
- Completed Site Remediation MACT applicability determinations for seven refineries (located in Texas, California, and St. Croix) and two chemical plants (located in Texas and Arkansas). As part of these determinations, assessed various remediation system components and activities subject to emission controls and provided methods of achieving compliance including modifying existing facility procedures, developing Site Remediation MACT-compliant Sampling and Analysis Plans, and Soil Management Plans.
- Developed a spreadsheet-based tool for use by a major energy corporation to assess the applicability of Site Remediation MACT at its 16 U.S. refineries. Subsequently conducted an internet-based training session for corporate and facility personnel to demonstrate the use of the tool and the MACT requirements. Completed applicability assessments and assisted in developing and documenting compliance strategies at four of the client's Texas refineries.
- Trained over 100 employees over a three-day period at a refinery in the U.S. Virgin Islands on the implementation of new or updated procedures designed to maintain the refinery's compliance with Site Remediation MACT.
- Managed remedial and investigative activities at multiple gasoline retail facilities in Houston and Austin, Texas. Responsibilities included client and agency interaction and coordination of day-to-day activities.
- Directed routine ground water monitoring activities for a portfolio of LPST sites in Houston and Austin. Tasks included coordinating sampling activities, verifying field and laboratory analytical data, inferring data trends, constructing potentiometric surface maps, and isoconcentration maps and completing required reports.
- Directed numerous subsurface investigations at LPST sites in the Houston, Texas area in compliance with State requirements and was responsible for preparing the reports for submittal to the client and the state regulatory agency.
- Directed the completion of risk assessments to evaluate the potential risks associated with the exposure of human and environmental receptors to affected media under various scenarios for industrial and gasoline retail sites in Texas.
- Directed and oversaw the removal of 11 UST systems at gasoline retail facilities in the Houston, Texas area.
- Designed ground water and LNAPL recovery systems utilizing pneumatic and electrical pumps for facilities Midland, Houston, Baytown, and Conroe, Texas. Additionally, constructed ground water recovery and treatment systems at locations in Ft. Worth and Dawson, and Houston, Texas.
- Prepared design drawings and construction specifications to cover petroleum hydrocarbon affected soils from a former surface impoundment with a 3-acre reinforced concrete parking lot.
- Developed design drawings and specifications and oversaw the excavation of over 9,000 cubic yards of affected soil at a former pesticide blending facility near Waco, Texas.
- Managed preparation of an Activity Characterization Report required to approve the operation of a floating production, storage, and off-loading type unit for the production of oil and gas from up to seven wells off the coast of Brazil.